

File 3A

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PERMITS ADMINISTRATION  
BRANCH

Special Conditions for  
Brookhaven National Laboratory - Installation of Boiler #7  
NYSDEC Permit to Construct  
P R E L I M I N A R Y - D R A F T

**I. Emission Limits.**

**1. Emission Point #00007.**

**Low NO<sub>x</sub> Burner**

**Emission Limits:**

NO<sub>x</sub>: 0.40 lbs/mmBTU and 58.80 lbs/hr  
CO: 0.043 lbs/mmBTU and 23.30 lbs/hr  
PM, PM<sub>10</sub>: 0.08 lbs/mmBTU and 11.80 lbs/hr  
VOC: 0.034 lbs/mmBTU and 5.00 lbs/hr.

2. The sulfur content of the fuel burned in the boiler of emission point #7 shall not exceed 0.50 percent by weight.

3. The nitrogen content of the fuel burned at the facility shall not exceed 0.30 percent by weight.

4. All emission limits based on heat input correspond to the Higher Heating Value (HHV) of the fuel burned.

5. These limits apply at all loads of operation, except during periods of start-up and shutdown (not to exceed three hours per occurrence) and malfunctions (as stated in the paragraphs of subdivision 6NYCRR Part 201.5 (d)).

6. All emission limits are based on a one hour average.

**II. Operating Limits.**

1. Within 60 days of initial start-up, Emission Point #4 shall be physically inoperative.

2. Sitewide annual emissions will be limited to the following:

SO<sub>2</sub>: 332.2 tons per year  
NO<sub>x</sub>: 159.0 tons per year  
CO: 113.3 tons per year  
TSP: 49.2 tons per year  
PM<sub>10</sub>: 35.7 tons per year  
VOC: 39.7 tons per year

Annual emissions are computed using the attached report and compiled on a quarterly rolling average basis. Exceedance of the annual limitation is considered a violation of the Federal Prevention of Significant Deterioration (PSD) regulations and will be cause for enforcement action.

### III Testing Requirement

1. Stack testing for the emissions of NO<sub>x</sub>, CO, PM, PM<sub>10</sub>, and VOC's is required from emission Point #7, firing #6 residual oil at maximum firing rate.
2. All required stack testing must be performed and a report submitted to NYSDEC and USEPA within 180 days of initial start-up of the boiler, or within 60 days of commercial operation of the facility, whichever comes first. No extensions of this deadline will be granted by NYSDEC.
3. All testing must be done in accordance with protocols approved by NYSDEC in advance of testing. Protocols must be submitted for approval at least 60 days in advance of testing. NYSDEC must be provided with at least 30 days advanced notice of testing. Failure to notify or use approved protocols is grounds for rejection of such tests.

### IV. Compliance Certification.

1. Continuous Emissions Monitoring (CEM).
  - a. Prior to the date of commercial operation and thereafter, Brookhaven National Laboratory (BNL) shall install, calibrate, maintain, and operate a continuous monitoring and recording system to measure NO<sub>x</sub> and opacity in the boiler exhaust stack of emission point #7.
  - b. These systems shall meet the requirements of 40 CFR 60 Appendix B and Appendix F and the NESCAUM Guidance Document for CEMS (September, 1990).
  - c. Not less than 90 days prior to installation of the CEMS system, BNL shall submit to NYSDEC a Preliminary Monitoring Plan for the CEMS system. This plan must include a description of the CEM equipment, design specifications and the information required on page 26 of the NESCAUM guidance document. This plan is subject to NYSDEC approval.
  - d. Not less than 90 days prior to the date of start-up of the boiler, BNL shall submit to NYSDEC a CEM Performance Test Protocol for the certification of the CEMS system. CEM performance testing may not begin until the protocol is approved by NYSDEC.

e. BNL must notify NYSDEC 30 days in advance of the date upon which demonstration of the CEM system performance test will commence (40 CFR Part 60.13(c)). This date shall be no later than 60 days after the facility's start-up.

f. BNL shall submit the CEM Certification Performance Test Report to NYSDEC within 30 days after completion of such test. This report is subject to NYSDEC approval.

g. Within 90 days of NYSDEC approval of the CEM Certification Performance Test, BNL shall submit a CEMs Quality Assurance Plan to NYSDEC. This plan must meet the requirements of the NESCAUM guidance document. This plan is subject to NYSDEC approval.

h. BNL shall submit a quarterly written CEM report to NYSDEC for every calendar year quarter. All quarterly reports shall be postmarked by the 30th day following the end of each calendar quarter and shall include:

i. A summary of excess emissions and CEMs downtime reported in the format of Attachment A (or equivalent).

ii. The results of the quarterly monitoring performance audit, reported in the format of 40 CFR 60 Appendix F (or equivalent).

iii. Excess emissions shall be identified as any one-hour block period during which the average emissions of NOx or opacity, as measured by the CEM system, exceeds the corresponding mass or concentration emission limits set forth in Section I.1.

iv. For the purposes of this permit, excess emissions indicated by the CEM system for one hour block periods other than start-ups and shutdowns, malfunctions (as stated in the paragraphs of subdivision 6NYCRR Part 201.5 (d)) and CEM calibrations may be considered violations of the applicable emission limits.

i. BNL shall maintain a file of all measurements, including CEM system performance evaluations; all CEM systems or monitoring device calibration checks; adjustments and maintenance performed on these systems or devices; and all other information required by 40 CFR Part 60 recorded in a permanent form suitable for inspection. The file shall be retained for at least three years following the date of such measurement, maintenance, reports, and records.

j. Within thirty (30) days of the effective date of this permit, the permittee shall send to the New York State Department of Environmental Conservation (NYSDEC), Room 602, 50 Wolf Road, Albany, New York 12233-11010, Attention: Ms. K. Mohan, a certified check payable to NYSDEC in the amount of \$20,000 to be placed in an account for the Departments' environmental compliance monitoring activities for the permitted facility. This amount will be used toward payment of the first year costs for such activities, which sum shall be subject to quarterly revision by the Department.

Subsequent quarterly payments shall be made for the duration of this permit to provide an account balance sufficient to maintain the annual cost assessment.

Quarterly payments shall be made to the Department based on the following costs: (i) direct personal service costs and fringe benefits, including the cost of replacement personnel for the monitor position; (ii) direct non-personal service costs, including purchase or lease of a vehicle and its full operation costs; (iii) inflation and negotiated salary increases; and (iv) overhead and support costs at a calculated indirect cost rate based on a Federally approved plan.

Within thirty (30) days after receipt of a quarterly statement from the Department, the permittee shall forward the amount due to the address given above.

Upon termination of this permit and the payment of all outstanding costs, the unexpended balance will be returned to the permittee.

The Department may take appropriate action to enforce the payment provisions.

2. The boiler must comply with all parts of NSPS Subpart Db, including 60.43b, 60.44b, 60.45b, 60.46b, 60.47b, 60.48b and 60.49b requirements. Opacity from the boiler stack shall not be greater than 20% (6-minute average) except for one 6-minute period per hour of not more than 27% opacity.

3. NYSDEC reserves the right to inspect this facility as deemed necessary to determine compliance with this permit. Such inspections may be performed without prior notification by NYSDEC. Routine inspections will be made during reasonable business hours, however, NYSDEC reserves the right to enter the facility at any time if there is cause to believe that the facility is in non-compliance.

#### V. Record Keeping and Reporting.

1. Within ten (10) days after the end of a calendar quarter, the permit holder must submit a construction progress report to the attention of the Regional Air Engineer, Region 1, Stony Brook.

2. BNL must comply with the notification and record keeping requirements of 40 CFR 60.7 for the boiler. The major milestones of 40 CFR 60.7 are to notify USEPA and NYSDEC of construction and facility start-up.

3. BNL must monitor and record the type and amount of fuel burned in the boiler. Such data must be accurate to  $\pm 5\%$ .



4. All copies of reports and notification required under this section must be submitted to the USEPA Region II Office and the NYSDEC Region 1 Office, with **two copies** sent to the NYSDEC Bureau of Application Review and Permitting in Albany. Unless stated otherwise, such reports or notification shall be submitted within thirty days after the end of each calendar year quarter. The addresses for the above offices are as follows:

NYSDEC Region 1 Office  
Attn: Mr. R. Capp  
Loop Road, Bldg 40  
Stony Brook, NY  
11790-2356

NYSDEC  
Bureau of Application Review  
and Permitting  
50 Wolf Road  
Albany, NY 12233

Director Air and Waste Management Division  
USEPA Region II  
26 Federal Plaza  
New York, NY 10278

6. All records required by this permit must be kept at the facility for the three most recent years, and must be made available upon request of a NYSDEC authorized agent.

7. A summary of the emission limits and operating restrictions of this permit must be posted in the control room of the facility and must be plainly visible (without obstructions) to the operator of the facility. A copy of this summary shall be submitted to NYSDEC prior to facility start-up and is subject to NYSDEC approval.

#### VI. Compliance.

1. Any violation of the conditions of this permit is subject to penalty under Article 71 of the New York State Environmental Conservation Law.

# BROOKHAVEN NATIONAL LABORATORY

## CENTRAL STEAM FACILITY QUARTERLY AIR EMISSIONS REPORT

REPORT PERIOD: Qtr; Calendar Year		% SULFUR By Weight	Fuel	Fuel	EMISSIONS THIS PERIOD IN TONS						
FUEL TYPES			Gallons	Pounds	SO2 [1]	NOx [2]	CO	TSP	PM-10	VOC	
Grade No. 6 Low Sulfur (<1% S)											
Grade No. 4											
Grade No. 2 (Includes Diesel and Jet Fuels)											
Total Emissions This Period (Tons)											
Total Emissions Calendar Year To Date (Tons) LAST FOUR QUARTERS											
Annual Allowable for PSD Non-Applicability (Tons)					445	159	19.3 [4]	35.2 [4]	30.3 [4]	1.0 [4]	
Percent of Allowable To Date											

### NOTES:

[1] - SO<sub>2</sub> are based on mass balance of fuel burned and actual sulfur content by weight.

[2] - NO<sub>x</sub> are based on total of EPA AP-42 calculations for Boilers 1A, 4 and 5 and NO<sub>x</sub> CEMS readings for Boiler 6.

[3] - Quantities of these pollutants are based on the following Emissions Factors Per EPA AP-42 unless noted otherwise.

- NO<sub>x</sub> - Grades No. 4 and No. 6 = 55 lb/1000 gal  
Grade No. 2 = 20 lb/1000 gal
- CO - All Grades @ 5 lb/1000 gal
- TSP - Grade No. 6 = [10(%S) + 3] lb/1000 gal  
Grade No. 4 = 7 lb/1000 gal  
Grade No. 2 = 2 lb/1000 gal
- PM-10 - Grade No. 6 = 7.17[1.25(%S) + .38] lb/1000 gal  
Grade No. 4 = 6.31 lb/1000 gal  
Grade No. 2 = 1 lb/1000 gal
- VOC - Grade No. 4 and No. 6 = 0.28 lb/1000 gal  
Grade No. 2 = 0.2 lb/1000 gal

[4] - Allowable quantities of these pollutants are "Good Faith" estimates. Allowable quantities for PSD De Minimis increase are significantly higher per 40 CFR 52.21.

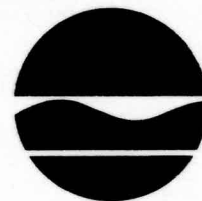
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 REVIEWER: \_\_\_\_\_

<u>Targeting Criteria</u>	
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Comments: \_\_\_\_\_

**New York State Department of Environmental Conservation**  
50 Wolf Road, Albany, New York 12233



**Thomas C. Jorling**  
Commissioner

Mr. Martin Fallier  
Department of Energy  
Brookhaven National Laboratory  
53 Bell Avenue  
Upton, New York 11973

September 9, 1992

Dear Mr. Fallier,

Enclosed for your review are the Special Conditions for the Number 7 boiler permit. Copies have been sent to the Regional Office and the USEPA Region 2 for comments. The modeling analysis is being reviewed by our Impact Assessment Section. Issuance of the Permit to Construct is based on a satisfactory review of the modeling procedures.

After reviewing the correspondence between the Department of Energy and the New York State DEC, it is my understanding that the NO<sub>x</sub> limit of 0.3 lbs/mmBTU established for boiler number 6 is unachievable at the current time. With the reductions for NO<sub>x</sub> imminent in the near future, it is the department's decision to grant the NSPS emission limit of 0.4 lbs/mmBTU for boiler number 6 and 7 until the regulation is effective. This should allow your plant managers additional time to fine tune your equipment to meet the upcoming emission standards.

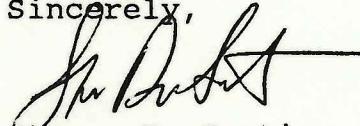
It should be noted that NO<sub>x</sub> RACT regulations currently being promulgated will require NO<sub>x</sub> reductions for all your boiler units greater than 50 mmBTU/hr. Please note that the facility wide NO<sub>x</sub> cap will be reduced accordingly.

In addition, upon further review of your emission calculations to determine an emission cap for SO<sub>2</sub>, 1983-84 figures show the usage of 2% sulfur oils. Your facility was never allowed a sulfur content greater than 1% sulfur. Emission limits were calculated using 1% sulfur limits. The SO<sub>2</sub> emission cap will be 332.2 tons per year for the facility.



Please respond with your comments to Steven De Santis, Bureau  
of Application Review and Permitting, Albany, N.Y.

Sincerely,



Steven De Santis  
Environmental Technician 3  
Bureau of Application Review and  
Permitting

(518) 457 7688

cc. U. Roman, NYSDEC Region 1  
D. Surpitski, Cental Office  
S. Riva, EPA Region 2

SD/sd

FILE BEHIND 3A  
NEW FILE - U.Y.

**TRANSMITTAL MEMO**  
**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**REGION II**

**DATE:** April 19, 1990

**SUBJECT:** PREVENTION OF SIGNIFICANT DETERIORATION OF AIR QUALITY (PSD)  
**Re:** Brookhaven National Laboratories

**FROM:** Steven C. Riva, Chief  
Air and Environmental Applications Section  
Permits Administration Branch

**TO:** Addressees

Attached Please Find: Information utilized by NYSDEC in making its PSD non-applicability determination

Dated: April 16, 1990

Company: NYSDEC

Signed by: James Harrington

Type of Review Required: PSD applicability

Start of Review Period: April 20, 1990

Submit Results to PAB: May 11, 1990

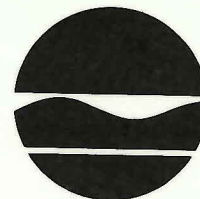
Special Instructions: None

Addressees: K. Eng, 2AWM-AC (Transmittal Letter)

cc: K. Mangels, 2AWM-AC (Entire Submittal)  
File behind 3A (Entire Submittal)

FILE BEHIND 3A  
(NEWFILE - NY)

**New York State Department of Environmental Conservation**  
50 Wolf Road, Albany, New York 12233



**Thomas C. Jorling**  
Commissioner

April 16, 1990

Mr. Steve Riva, Chief  
Air & Environmental Applications  
Section  
Permit Administration Branch  
Office of Policy & Management  
U. S. Environmental Protection  
Agency - Region II  
26 Federal Plaza  
New York, New York 10278

Dear Mr. ~~Riva~~: *STEVE*

As you requested, enclosed is a copy of the information used in making the PSD nonapplicability determination for the new (1985) boiler at Brookhaven National Laboratories. The applicant should be submitting compliance information regarding the NSPS in the near future.

If you have any questions regarding this information, please do not hesitate to call.

Sincerely,

James B. Harrington, P.E.  
Senior Sanitary Engineer  
Upstate Regional Support  
Section  
Division of Air Resources

Enclosure

cc: R. Capp

JBH:dd

Humberto Roman

Jim Harrington

SF / **Brookhaven National Laboratories, Boiler #6**

March 9, 1990

I have completed my portion of the review of the application for the above. Based on the fuel use/emissions limitations specified in the attached Special Conditions. The installation is not subject to PSD. The new boiler is subject to NSPS Subpart Db. Special Conditions are included which include requirements of this regulation.

I have prepared a Notice of PSD Nonapplicability which must be published in the Environmental Notice Bulletin.

If you have any questions, do not hesitate to contact me.

cf  
Attachment



### PSD Notice of Nonapplicability

Brookhaven National Laboratories has installed a 140 mmBTU/hr. oil-fired boiler at their facility in Upton, Long Island. This boiler replaced an existing oil-fired boiler. NYSDEC has reviewed this project to determine if it is subject to the Federal Prevention of Significant Deterioration (PSD) regulations codified at 40 CFR 52.21. NYSDEC has determined that this project is not subject to those regulations. Information relative to this determination is available for public inspection at the DEC Region 1 office, which is located at Bldg. 40, SUNY at Stony Brook, Stony Brook, NY 11790.

3/9/90

JBH:cf

DRAFT: JBH:cf  
3/8/90

#### SPECIAL CONDITIONS FOR BOILER #6

1. Emission of  $\text{NO}_x$  shall not exceed 0.30 lb/mmBtu and 44.1 lb/hr.
2. Continuous monitoring of emission of  $\text{NO}_x$  is required. The continuous monitor shall meet the requirements of 40 CFR 60 Appendix B or F. Equipment and location must be approved by DEC before installation. Records of data measured by these monitors must be kept for three years and made available upon request.
3. Stack testing for  $\text{NO}_x$  is required within 180 days of initial startup. Testing must be done using protocols approved by DEC in advance of testing. DEC must be provided with at least 30 days advance notice of testing. Failure to notify or use approved protocols is grounds for rejection of such tests.
4. Sitewide annual emissions of  $\text{SO}_2$  and  $\text{NO}_x$  are limited to 445 tons and 159 tons, respectively. Annual emissions are computed using the attached report and compiled on a quarterly rolling average basis. Exceedance of the annual limitation is considered a violation of the Federal Prevention of Significant Deterioration (PSD) regulations and will be cause for enforcement action.

5. Brookhaven National Laboratories must comply with all applicable parts of NSPS Subpart Db, which applies to boiler number 6. These requirements include the monitoring requirements specified in 40 CFR 60.47b and 40 CFR 60.48b.

# BROOKHAVEN NATIONAL LABORATORY

## CENTRAL STEAM FACILITY QUARTERLY AIR EMISSIONS REPORT

REPORT PERIOD: Qtr; Calendar Year									
FUEL TYPES	% SULFUR	Fuel	Fuel	EMISSIONS THIS PERIOD IN TONS [3]					
	By Weight	Gallons	Pounds	SO2 [1]	NOx [2]	CO	TSP	PM-10	VOC
Grade No. 6 Low Sulfur (<1% S)									
Grade No. 4									
Grade No. 2 (Includes Diesel and Jet Fuels)									
Total Emissions This Period (Tons)									
Total Emissions Calendar Year To Date (Tons) LAST FOUR QUARTERS									
Annual Allowable for PSD Non-Applicability (Tons)				445	159	19.3 [4]	35.2 [4]	30.3 [4]	1.0 [4]
Percent of Allowable To Date									

### NOTES:

[1] - SO<sub>2</sub> are based on mass balance of fuel burned and actual sulfur content by weight.

[2] - NO<sub>x</sub> are based on total of EPA AP-42 calculations for Boilers 1A, 4 and 5 and NO<sub>x</sub> CEMS readings for Boiler 6.

[3] - Quantities of these pollutants are based on the following Emissions Factors Per EPA AP-42 unless noted otherwise.

- NO<sub>x</sub> - Grades No. 4 and No. 6 = 55 lb/1000 gal  
Grade No. 2 = 20 lb/1000 gal
- CO - All Grades @ 5 lb/1000 gal
- TSP - Grade No. 6 = [10(%S) + 3] lb/1000 gal  
Grade No. 4 = 7 lb/1000 gal  
Grade No. 2 = 2 lb/ 1000 gal
- PM-10 - Grade No. 6 = 7.17[1.25(%S) + .38] lb/1000 gal  
Grade No. 4 = 6.31 lb/1000 gal  
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- VOC - Grade No. 4 and No. 6 = 0.28 lb/1000 gal  
Grade No. 2 = 0.2 lb/1000 gal

[4] - Allowable quantities of these pollutants are "Good Faith Values", actual allowable quantities for PSD De Minimus increase are significantly higher per 40 CFR 52.21.

03/08/90

08:49

PLANT ENGR BROOKHAVEN NATL LAB

003/003





## Department of Energy

Brookhaven Area Office  
53 Bell Avenue  
Upton, New York 11973

MAR 13 1990

Mr. Humberto Roman  
Division of Air Resources  
New York State Department of  
Environmental Conservation  
Building 40 - SUNY  
Stony Brook, New York 11794

SUBJECT: BROOKHAVEN NATIONAL LABORATORY (BNL) CERTIFICATES TO CONSTRUCT AND  
OPERATE BOILER NO. 6

Reference: Letter to H. Roman of New York State DEC from J. Bellows of DOE,  
BHO, dated February 26, 1990.

Dear Mr. Roman:

Mr. Jim Harrington of New York State DEC Central Office has requested additional information regarding reporting and verification of air emissions levels for Boiler #6 and the Central Steam Facility.

In subsequent discussions between Mr. Harrington and BNL, Mr. Harrington agreed that the following reporting commitment by BNL, submitted on a quarterly basis, would be satisfactory for verification of compliance as set forth in the referenced letter:

1. For verification of compliance with NSPS guidelines for  $\text{NO}_x$  of less than 0.4 lbs/10<sup>6</sup> Btu, Boiler No. 6 will be fitted with an approved  $\text{NO}_x$  continuous emissions monitoring system (CEMS). Reporting and recordkeeping will be in compliance with 40 CFR Section 60.49b.
2. For verification of compliance with PSD non-applicability for boiler modification of the Central Steam Facility (CSF), emissions data will be provided as indicated on the attached spreadsheet titled "BNL Central Steam Facility Quarterly Air Emissions Report". The basis of calculations performed for criteria pollutants CO, TSP, PM-10 and VOC will be actual fuel consumed applied to AP-42 emission factors.  $\text{NO}_x$  emissions will be calculated similarly except the component emitted by Boiler No. 6 will be the actual value recorded by the CEMS.  $\text{SO}_2$  emissions will be calculated by mass balance of fuel consumed using sulfur content analysis data.
3. For purposes of tracking compliance, the report will indicate "Percent of Annual Allowable Emissions to Date" for each pollutant. In cases where this value approaches or exceeds the pro-rated quarterly percentage (i.e.  $\text{SO}_2$  over 25% for the first quarter), BNL will provide an explanation and a description of corrective action to be taken.

Mr. Humberto Roman

-2-

MAR 13 1990

It is our understanding that with this additional information the DEC will issue shortly the permit to construct (PC).

We would appreciate your expeditious review of the enclosed information. If you have any questions, please do not hesitate to contact us.

Sincerely,

Jerry L. Bellows  
Area Manager

Enclosure:  
BNL Central Steam Facility  
Quarterly Air Emissions Report

cc: J. Harrington, NYSDEC, w/encl.  
A. Machlin, NYSDEC, w/encl.  
M. Bebon, BNL, w/o encl.  
R. Casey, BNL, w/o encl.  
M. Fallier, BNL, w/o encl.  
G. Kinne, BNL, w/o encl.  
J. Medaris, BNL, w/o encl.  
E. Murphy, BNL, w/o encl.  
E. Rohrer, BNL, w/o encl.  
B. Royce, BNL, w/o encl.

# BROOKHAVEN NATIONAL LABORATORY

## CENTRAL STEAM FACILITY QUARTERLY AIR EMISSIONS REPORT

REPORT PERIOD: Qtr; Calendar Year									
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Grade No. 4									
Grade No. 2 (Includes Diesel and Jet Fuels)									
Total Emissions This Period (Tons)									
Total Emissions Calendar Year To Date (Tons)									
Annual Allowable for PSD Non-Applicability (Tons)				445	159	19.3 [4]	35.2 [4]	30.3 [4]	1.0 [4]
Percent of Allowable To Date									

### NOTES:

[1] - SO2 are based on mass balance of fuel burned and actual sulfur content by weight.

[2] - NOx are based on total of EPA AP-42 calculations for Boilers 1A, 4 and 5 and NOx CEMS readings for Boiler 6.

[3] - Quantities of these pollutants are based on the following Emissions Factors Per EPA AP-42 unless noted otherwise.

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Grade No. 2 = 20 lb/1000 gal
- CO - All Grades @ 5 lb/1000 gal
- TSP - Grade No. 6 =  $[10(\%S) + 3]$  lb/1000 gal  
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Grade No. 2 = 0.2 lb/1000 gal

[4] - Allowable quantities of these pollutants are "Good Faith Values", actual allowable quantities for PSD De Minimus increase are significantly higher per 40 CFR 52.21.



## Department of Energy

Brookhaven Area Office

53 Bell Avenue

Upton, New York 11973

February 26, 1990

Mr. Humberto Roman  
Division of Air Resources  
New York State Department of  
Environmental Conservation  
Building 40 - SUNY  
Stony Brook, NY 11794

SUBJECT: BROOKHAVEN NATIONAL LABORATORY (BNL) -  
CERTIFICATES TO CONSTRUCT AND OPERATE BOILER NO. 6

Dear Mr. Roman:

On February 13, 1990 we met with you and Messrs. Jim Harrington and Reggie Parker of the DEC central office, Bureau of Source Control, to discuss the procedure required to finalize and obtain subject certificates for Boiler No. 6. Mr. Harrington requested that we supply some further information on the project. The requested materials are attached:

1. Actual air emission calculations from all existing boilers using, per our agreement, the two-year average (1983/1984) prior to construction of Boiler No. 6 (Attachment 1).
2. Completed PSD Applicability Determination Form from Air Guide-12 and summary Table 3, Determination of PSD non-applicability for the BNL Boiler Plant Modification (Attachment 2).
3. Federal NSPS applicability review for Boiler No. 6. BNL will comply with the NSPS requirements of 0.40 lb NO<sub>x</sub> per million BTU heat input including performance test, NO<sub>x</sub> monitoring and reporting/recordkeeping requirements (Attachment 3).

It is BNL's understanding that with this additional information the DEC will issue shortly the Permit to Construct (PC). BNL further understands that after the PC is issued, the NO<sub>x</sub> emission performance test will be performed on Boiler No. 6. Following a successful performance test, the DEC will issue the Certificate to Operate (CO) Boiler No. 6.



February 26, 1990

We would appreciate your expeditious review of the enclosed information.  
If you have any questions, please do not hesitate to contact us.

Sincerely,



Jerry L. Bellows  
Area Manager

Enclosures:  
As stated

cc w/enclosures:

~~J. Harrington, NYSDEC~~  
A. Machlin, NYSDEC  
E. P. Rohrer, BNL  
G. Kinne, BNL  
M. J. Bebon, BNL  
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M. Fallier, BNL  
J. B. Medaris, BNL  
E. T. Murphy, BNL  
B. Royce, BNL

BROOKHAVEN NATIONAL LABORATORY  
CENTRAL STEAM AND OTHER BOILER FACILITY EMISSIONS

The attached calculation Tables 1 and 2 show the annual SO<sub>2</sub> emissions from the Brookhaven National Laboratory (BNL) Boiler Facility to be 392 and 420 tons per year (TPY) for Fiscal Years 1983 and 1984, respectively. The two year average SO<sub>2</sub> emission is 406 TPY. The following air emission calculations for the remaining criteria pollutants are based on the actual fuels burned in 1983/1984 (shown in Tables 1 and 2) and AP-42 emission factors for fuel oil combustion in industrial boilers burning residual and distillate fuel oils (10/86). The 1983/1984 annual average quantity of fuels burned at the BNL Boiler Facility are as follows:

High Sulfur (2%) No. 6 Oil (Includes Reconstituted and Navy Special)	= 626,490 gal/yr
Low Sulfur (1%) No. 6 Oil	=1,793,426 gal/yr
No. 4 Oil (Includes Reconstituted and Marine Diesel)	=1,160,202 gal/yr
No. 2 Oil (Includes Mineral Spirits and Jet Fuel)	= <u>2,152,095 gal/yr</u>
TOTAL	5,732,213 gal/yr

#### PARTICULATE MATTER (PM) EMISSIONS

$$\text{Grade 6 Oil} = 10(S) + 3 \text{ lb}/10^3 \text{ gal}$$

$$= \frac{[10(2) + 3] \text{ lb}}{10^3 \text{ gal}} \times \frac{626,490 \text{ gal}}{\text{yr}} + \frac{[10(1) + 3]}{10^3 \text{ gal}} \times \frac{1,793,426 \text{ gal}}{\text{yr}} / 2000 = 18.9 \text{ TPY}$$

$$\text{Grade 4 Oil} = \frac{7 \text{ lb}}{10^3 \text{ gal}} \times \frac{1,160,202 \text{ gal}}{\text{yr}} / 2000 = 4.1 \text{ TPY}$$

$$\text{Grade 2 Oil} = \frac{2 \text{ lb}}{10^3 \text{ gal}} \times \frac{2,152,095 \text{ gal}}{\text{yr}} / 2000 = 2.2 \text{ TPY}$$

$$\text{TOTAL PM} = 25.2 \text{ TPY}$$

#### PM-10 EMISSIONS

$$\text{Grade 6 Oil}$$

$$= 7.17[(1.25(2) + .38)(626.49) + (1.25(1) + .38)(1,793.4)] / 2000 = 16.9 \text{ TPY}$$

$$\text{Grade 4 Oil} = 7.17(.88)(1160.2) / 2000 = 3.7 \text{ TPY}$$

$$\text{Grade 2 Oil} = \frac{1 \text{ lb}}{10^3 \text{ gal}} \times \frac{2152 \times 10^3 \text{ gal}}{\text{yr}} / 2000 = 1.1 \text{ TPY}$$

$$\text{TOTAL PM-10} = 21.7 \text{ TPY}$$

#### CARBON MONOXIDE EMISSIONS

$$\text{All Grades} = \frac{5 \text{ lb}}{10^3 \text{ gal}} \times \frac{5,732,213 \text{ gal}}{\text{yr}} / 2000 = 14.3 \text{ TPY}$$

#### NITROGEN OXIDE EMISSIONS

$$\text{Grades 4 and 6 Oil} = \frac{55 \text{ lb}}{10^3 \text{ gal}} \times \frac{3,580,118 \text{ gal}}{\text{yr}} / 2000 = 98.5 \text{ TPY}$$

$$\text{Grade 2 Oil} = \frac{20 \text{ lb}}{10^3 \text{ gal}} \times \frac{2,152,095 \text{ gal}}{\text{yr}} / 2000 = 21.5 \text{ TPY}$$

$$\text{TOTAL NO}_x = 120.0 \text{ TPY}$$

#### NONMETHANE VOLATILE ORGANIC COMPOUNDS (VOC)

$$\text{Grades 4 and 6 Oil} = \frac{0.28 \text{ lb}}{10^3 \text{ gal}} \times \frac{3,580,118 \text{ gal}}{\text{yr}} / 2000 = 0.5 \text{ TPY}$$

$$\text{Grade 2 Oil} = \frac{0.2 \text{ lb}}{10^3 \text{ gal}} \times \frac{2,152,095 \text{ gal}}{\text{yr}} / 2000 = 0.2 \text{ TPY}$$

$$\text{TOTAL VOC} = 0.7 \text{ TPY}$$

TABLE 1

**BROOKHAVEN NATIONAL LABORATORY****Calculation of Annual SO<sub>2</sub> Emissions****FY 1983**

<i>Fuel</i>	<i>Gal Burned</i>	<i>Sulfur</i>	<i>lb/gal</i>	<i>Btu/gal</i>	<i>Total Fuel (lb/yr)</i>	<i>Total Btu/yr</i>	<i>Total S (lb/yr)</i>
<b><i>Central Steam Facility</i></b>							
Low Sulfur No. 6 Oil	2,004,482	1.0%	8.2	148,000	16,436,752	2.97E+11	164,368
High Sulfur No. 6 Oil	0	2.0%	8.2	150,000	0	0.00E+00	0
Mineral Spirits	823,506	0.1%	6.5	120,000	5,352,789	9.88E+10	5,353
"Reconstituted No. 6" Oil	310,844	2.0%	8.2	145,000	2,548,921	4.51E+10	50,978
Navy Special	165,503	2.0%	8.2	150,000	1,357,125	2.48E+10	27,142
Alcohol	0	0.0%	6.7	75,000	0	0.00E+00	0
Marine Diesel	675,328	1.5%	7.2	142,000	4,862,362	9.59E+10	72,935
Jet Fuel	1,044,155	0.2%	6.8	125,000	7,100,254	1.31E+11	14,201
"Reconstituted No. 4" Oil	287,882	2.0%	7.7	142,000	2,216,691	4.09E+10	44,334
Other	0	1.0%	7.7	142,000	0	0.00E+00	0
<b>Total CSF</b>	<b>5,311,700</b>				<b>39,874,894</b>	<b>7.33E+11</b>	<b>379,311</b>
<b><i>Other Boilers</i></b>							
No. 4 Fuel Oil	145,054	1.0%	7.7	142,000	1,116,916	2.06E+10	11,169
No. 2 Fuel Oil	75,491	0.3%	7.2	138,000	543,535	1.04E+10	1,631
<b>Total Other</b>	<b>220,545</b>				<b>1,660,451</b>	<b>3.10E+10</b>	<b>12,800</b>
<b>Site Totals</b>	<b>5,532,245</b>				<b>41,535,345</b>	<b>7.64E+11</b>	<b>392,111</b>
<b>Total Site SO<sub>2</sub> Emissions</b>							<b>392 Tons/yr</b>
<b>Average S in Fuel by Wgt.</b>							<b>0.9%</b>

TABLE 2

# BROOKHAVEN NATIONAL LABORATORY

## Calculation of Annual SO2 Emissions

**FY 1984**

<i>Fuel</i>	<i>Gal Burned</i>	<i>Sulfur</i>	<i>lb/gal</i>	<i>Btu/gal</i>	<i>Total Fuel (lb/yr)</i>	<i>Total Btu/yr</i>	<i>Total S (lb/yr)</i>
<b>Central Steam Facility</b>							
Low Sulfur No. 6 Oil	1,582,369	1.0%	8.2	148,000	12,975,426	2.34E+11	129,754
High Sulfur No. 6 Oil	347,664	2.0%	8.2	150,000	2,850,845	5.21E+10	57,017
Mineral Spirits	858,673	0.1%	6.5	120,000	5,581,375	1.03E+11	5,581
"Reconstituted No. 6" Oil	236,071	2.0%	8.2	145,000	1,935,782	3.42E+10	38,716
Navy Special	192,897	2.0%	8.2	150,000	1,581,755	2.89E+10	31,635
Alcohol	0	0.0%	6.7	75,000	0	0.00E+00	0
Marine Diesel	852,604	1.5%	7.2	142,000	6,138,749	1.21E+11	92,081
Jet Fuel	1,405,672	0.2%	6.8	125,000	9,558,570	1.76E+11	19,117
"Reconstituted No. 4" Oil	216,322	2.0%	7.7	142,000	1,665,679	3.07E+10	33,314
Other	0	1.0%	7.7	142,000	0	0.00E+00	0
<b>Total CSF</b>	<b>5,692,272</b>				<b>42,288,181</b>	<b>7.80E+11</b>	<b>407,215</b>
<b>Other Boilers</b>							
No. 4 Fuel Oil	143,214	1.0%	7.7	142,000	1,102,748	2.03E+10	11,027
No. 2 Fuel Oil	96,693	0.3%	7.2	138,000	696,190	1.33E+10	2,089
<b>Total Other</b>	<b>239,907</b>				<b>1,798,937</b>	<b>3.37E+10</b>	<b>13,116</b>
<b>Site Totals</b>	<b>5,932,179</b>				<b>44,087,118</b>	<b>8.14E+11</b>	<b>420,331</b>
<b>Total Site SO2 Emissions</b>							<b>420 Tons/yr</b>
<b>Average S in Fuel by Wgt.</b>							<b>1.0%</b>

LOC FAC EP

## Appendix III

SIC no. \_\_\_\_\_

## PSD Applicability Determination

Facility Name Brookhaven National LaboratoryAddress 53 Bell Avenue, Upton, N.Y. 11973FACILITY

Table A: Facility Emissions Summary (T/Yr)

	TSP	SO <sub>2</sub>	CO	NO <sub>x</sub>	VOC	Pb
Current Emissions	25.2	406	14.3	120	0.7	
Net change this modification	10.0	39	5.0	39	0.3	
New Emissions Total	35.2	445	19.3	159	1.0	

1. Any attainment pollutants currently 250 T/Y? yes ☒ no ☐
2. Is facility listed as one of 28 major source categories? yes ☒ no ☐
3. If yes to #2, are any attainment pollutants 100 T/Y? yes ☒ no ☐
- If yes to #1 or #3, facility is MAJOR for PSD purposes.

SOURCE

Description of proposed new source(s)

Table B: Emissions from Proposed Source

A	B	C	D	E
Contaminant	Deminimis Level (T/Y)	Annual Emissions at 8760 Hr/Yr (T/Y)	Modified Annual Emissions after netting and SC (T/Y)	D > B Y/N
SO <sub>2</sub>	40		39	N
NO <sub>x</sub>	40		39	N
TSP	25		10	N

4. Is netting available? yes ☒ no ☐ 5. Are special conditions available?  
yes ☒ no ☐

If yes, describe on back of page and indicate modified annual emissions on Column D.

If the facility is MAJOR for PSD purposes, the new source IS SUBJECT to PSD for the pollutants indicated on Column E.

6. Is source subject to PSD? yes ☐ no ☒



TABLE 3

## DETERMINATION OF PSD NON-APPLICABILITY

BROOKHAVEN NATIONAL LABORATORY BOILER PLANT MODIFICATION

		EMISSIONS (TONS/YEAR)					
		<u>SO<sub>2</sub></u>	<u>NO<sub>x</sub></u>	<u>CO</u>	<u>TSP</u>	<u>PM-10</u>	<u>VOC</u>
1.	Emissions from Existing Boilers for 1983/1984	406	120	14.3	25.2	21.7	0.7
2.	Potential Enforceable Emissions from Boiler Modifications	445	159	19.3	35.2	30.3	1.0
3.	Net Potential Emissions Increase	39	39	5.0	10.0	8.6	0.3
4.	PSD De Minimus Increase (40 CFR 52.21)	40	40	100.0	25.0	15.0	40.0
5.	PSD Applicable	NO	NO	NO	NO	NO	NO

APPLICABILITY ANALYSIS OF FEDERAL NSPS TO  
BROOKHAVEN NATIONAL LABORATORY BOILER NO. 6

The following is based on a review of 40 CFR Part 60 - Standards of Performance for New Stationary Sources, Revised as of July 1, 1989.

Subpart Db - Standards of Performance for Industrial - Commercial - Institutional Steam Generating Units apply, according to Section 60.40b, to each steam generating unit that commences construction after June 19, 1984 and that has a heat input capacity greater than 100 million Btu/hour. "Construction" is defined in Section 60.1 as fabrication, erection, or installation of an affected facility. "Commenced" is defined as the undertaking of a continuous program of construction or the entering into a contractual obligation to undertake and complete a continuous program of construction. BNL entered into a contractual obligation with the Boiler No. 6 manufacturer (CE) on November 20, 1984 thus Subpart Db applies because construction of Boiler No. 6 commenced after June 19, 1984.

Section 60.40b(b)(3) states that oil-fired units which commenced construction after June 19, 1984, but before June 19, 1986 and whose heat input capacity is between 100 and 250 million Btu/hour (i.e. BNL Boiler No. 6) are only subject to the NO<sub>x</sub> standards. This is because the standards of performance limiting emissions of

NO<sub>x</sub> from oil-fired boilers were first promulgated by EPA on November 25, 1986 (51 FR 42768). At that time oil-fired boilers were not subject to particulate matter (PM) or SO<sub>2</sub> emission limits. PM emission standards from oil-fired boilers and SO<sub>2</sub> emission standards from coal-and oil-fired boilers were subsequently proposed by EPA on June 19, 1986 (51 FR 22384) and promulgated on December 16, 1987 (52 FR 47826). For this reason, the BNL oil-fired Boiler No. 6 is only subject to the November 25, 1986 promulgated performance standards which cover only NO<sub>x</sub>.

Section 60.44b(a) requires that oil-fired boilers be limited to the following NO<sub>x</sub> emissions:

Distillate Oil (No. 1 & No. 2 with less than 0.05%N)

Low heat release rate boiler	0.10 lb/10 <sup>6</sup> Btu
High heat release rate boiler	0.20 lb/10 <sup>6</sup> Btu

Residual Oil (No. 1 & No. 2 with more than 0.05%N and No. 4, 5 and 6)

Low heat release rate boiler	0.30 lb/10 <sup>6</sup> Btu
High heat release rate boiler	0.40 lb/10 <sup>6</sup> Btu

Section 60.41b defines "heat release rate" as the boiler design heat input capacity (Btu/hour) divided by the furnace volume (cubic feet); the furnace volume is that volume bounded by the front furnace wall where the burner is located, the furnace side waterwall, and extending to the level just below or in front of the first row of convection pass tubes. "High heat release rate" is defined as a heat release rate of 70,000 Btu/hour-ft<sup>3</sup> or more. The BNL Boiler No. 6 heat release rate is calculated as follows:

$$\frac{147 \times 10^6 \text{ Btu/hour}}{2088 \text{ ft}^3} = 70,402 \text{ Btu/hour-ft}^3$$

Thus the BNL Boiler No. 6 has a high heat release rate (i.e. more than 70,000 Btu/hour-ft<sup>3</sup>) and the applicable Federal NSPS is therefore 0.40 lb NO<sub>x</sub> per million Btu heat input. The Boiler No. 6 was purchased with low-NO<sub>x</sub> burners with a guaranteed NO<sub>x</sub> emission limit of 0.30 lb per million Btu which is below the applicable NSPS.

With regard to performance test, Section 60.46b(e)(1) requires an initial compliance test using the continuous NO<sub>x</sub> monitor for 30 successive steam generating unit operating days and use of the 30-day average emission rate. BNL agrees to do the required NO<sub>x</sub> performance test on Boiler No. 6. If the residual oil being burned

in Boiler No. 6 has more than 0.30%N, then continued determination of NO<sub>x</sub> emission compliance on a continuous basis using a 30-day rolling average is required. If the residual oil has less than 0.30%N, then repetition of the initial performance test is done only upon DEC's request.

Regarding emission monitoring for NO<sub>x</sub>, if the oil being burned in Boiler No. 6 has less than 0.3% Nitrogen, Section 60.48b(b) provides an exception to continuous NO<sub>x</sub> monitoring under paragraph (g). Section 60.48b(g)(2) states that monitoring of the steam generating unit operating conditions and predicting NO<sub>x</sub> emission rates as specified in a plan submitted pursuant to Section 60.49b(c) is permitted in lieu of continuous NO<sub>x</sub> monitoring.

BNL believes that the oil being burned in Boiler No. 6 has less than 0.3%N, but until this is confirmed by oil analysis, a continuous emission monitoring system (CEMS) will be installed on Boiler No. 6 in accordance with all applicable DEC and EPA requirements (i.e. 40 CFR 60 Section 60.48b and Appendices B and F). Similarly, BNL will comply with the reporting and record keeping requirements of Section 60.49b.

OP LOCATION FACILITY EMISSION POINT  
 47 2200349161006 C

NEW YORK STATE  
 DEPARTMENT OF ENVIRONMENTAL CONSERVATION

COPIES  
 WHITE - ORIGINAL  
 BLUE - DIVISION OF AIR  
 WHITE - REGIONAL OFFICE  
 WHITE - FIELD REP.  
 YELLOW - APPLICANT



# STATIONARY COMBUSTION INSTALLATION

APPLICATION FOR PERMIT TO CONSTRUCT OR CERTIFICATE TO OPERATE

A ADD  
 C CHANGE  
 D DELETE

READ INSTRUCTIONS  
 CONTAINED IN  
 FORM 76-11-4  
 BEFORE ANSWERING  
 ANY QUESTION

S E C T I O N A	1. NAME OF OWNER / FIRM <b>U. S. Department of Energy</b>			9. NAME OF AUTHORIZED AGENT <b>Gerald C. Kinne</b>			10. TELEPHONE (516) <b>282-3711</b>			19. FACILITY NAME (IF DIFFERENT FROM OWNER/FIRM) <b>Brookhaven National Laboratory</b>			
	2. NUMBER AND STREET ADDRESS <b>53 Bell Avenue</b>			11. NUMBER AND STREET ADDRESS <b>40 Brookhaven Avenue</b>						20. FACILITY LOCATION (NUMBER AND STREET ADDRESS) <b>53 Bell Avenue</b>			
	3. CITY - TOWN - VILLAGE <b>Upton</b>		4. STATE <b>NY</b>	5. ZIP <b>11973</b>	12. CITY - TOWN - VILLAGE <b>Upton</b>		13. STATE <b>NY</b>	14. ZIP <b>11973</b>		21. CITY - TOWN - VILLAGE <b>Upton</b>		22. Zip <b>11973</b>	
	6. OWNER CLASSIFICATION A. <input type="checkbox"/> COMMERCIAL C. <input type="checkbox"/> UTILITY F. <input type="checkbox"/> MUNICIPAL I. <input type="checkbox"/> RESIDENTIAL B. <input type="checkbox"/> INDUSTRIAL D. <input checked="" type="checkbox"/> FEDERAL G. <input type="checkbox"/> EDUC. INST. J. <input type="checkbox"/> OTHER			E. <input type="checkbox"/> STATE H. <input type="checkbox"/> HOSPITAL		15. NAME OF P.E. OR ARCHITECT PREPARING PLANS <b>B. Levy, P. E.</b>		16. N.Y.S. P.E. OR ARCHITECT LICENSE NO. <b>N.Y.P.E. 58756</b>		17. TELEPHONE (212) <b>290-6864</b>		23. BUILDING NAME OR NUMBER <b>Building 610</b>	24. FLOOR NAME OR NUMBER <b>First</b>
	7. NAME & TITLE OF OWNERS REPRESENTATIVE <b>Jerry L. Bellows Area Manager</b>			8. TELEPHONE (516) <b>282-3424</b>		18. SIGNATURE OF OWNERS REPRESENTATIVE OR AGENT WHEN APPLYING FOR A PERMIT TO CONSTRUCT			25. START UP DATE MO/YR <b>12/85</b>		26. DRAWING NUMBERS OF PLANS SUBMITTED <b>14623-EM-01</b>		
27. PERMIT TO CONSTRUCT A. <input type="checkbox"/> NEW SOURCE B. <input type="checkbox"/> MODIFICATION			28. CERTIFICATE TO OPERATE A. <input type="checkbox"/> NEW SOURCE C. <input checked="" type="checkbox"/> EXISTING B. <input type="checkbox"/> MODIFICATION										

S E C T I O N B	29. EMISSION POINT ID. <b>6 1 0 0 6</b>		30. GROUND ELEVATION (FT.) <b>77</b>	31. HEIGHT ABOVE STRUCTURES (FT.) <b>17</b>	32. STACK HEIGHT (FT.) <b>62</b>	33. INSIDE DIMENSION(S) (IN.) <b>60</b>	34. EXIT TEMPERATURE (°F) <b>350</b>	35. EXIT VELOCITY (FT./SEC.) <b>34</b>	36. EXIT FLOW (ACFM) <b>39,500</b>	37. HEAT INPUT (MILLION BTU/HR) <b>147</b>	38. CONTINUOUS MONITOR(S) A. <input type="checkbox"/> OPACITY B. <input type="checkbox"/> SULFUR DIOXIDE C. <input type="checkbox"/> NITROGEN OXIDES D. <input checked="" type="checkbox"/> OXYGEN E. <input checked="" type="checkbox"/> CARBON DIOXIDE F. <input checked="" type="checkbox"/> OTHER CO
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S E C T I O N C	39. UNIT TYPE <b>01</b>		40. UNIT MANUFACTURER'S NAME AND MODEL NUMBER <b>Combustion Engineering 28-A-14</b>						41. UNIT HEAT INPUT <b>147</b>		42. AIR INTAKE <b>3</b>		43. SOURCE CODE <b>7320</b>			
	44. BURNER TYPE <b>52/53</b>		45. NO. OF BURNERS <b>2</b>		46. BURNER MANUFACTURER'S NAME AND MODEL NUMBER <b>Coen 495S/CPF24</b>				47. FUEL TYPE <b>36</b>		48. AVG. QUANTITY OF FUEL/HR <b>470</b>		49. MAX. QUANTITY OF FUEL/HR <b>1050</b>		50. QUANTITY OF FUEL/YR <b>2,420,000</b>	
	51. HRS./DAY <b>24</b>		52. DAYS/YEAR <b>215</b>		53. % OPERATION BY SEASON Winter Spring Summer Fall <b>0 0 3 0 4 0 3 0</b>				54. NAME OF SUPPLIER(S) <b>Hess Oil Company</b>							
	55. BURNER TYPE		56. NO. OF BURNERS		57. BURNER MANUFACTURER'S NAME AND MODEL NUMBER				58. FUEL TYPE		59. AVG. QUANTITY OF FUEL/HR		60. MAX. QUANTITY OF FUEL/HR		61. QUANTITY OF FUEL/YR	
	62. HRS./DAY		63. DAYS/YEAR		64. % OPERATION BY SEASON Winter Spring Summer Fall				65. NAME OF SUPPLIER(S)							

S	EMISSION CONTROL	CONTROL	MANUFACTURER'S NAME AND MODEL NUMBER	DISPOSAL	DATE INSTALLED	USEFUL
---	---------------------	---------	--------------------------------------	----------	-------------------	--------



SECTION

S = 15 lbs/1000 gal.  
N = 41 lbs/1000 gal.

Q = (470 gal/hr)(C)(E)(K) = Emissions in lbs/hr  
E = retention factor = 1  
C = contaminant concentration by weight fraction  
K = 7.5 lbs/gal.

Annual emissions = Q (24 hrs/day)(215 days/year)

RECEIVED

SEP 8 1989

N.Y.S.D.E.

DEPARTMENT OF ENVIRONMENTAL CONSERVATION

TO BE COMPLETED FOR ALL SOURCES USING ITEM 27 AND OTHER SOURCES AS DEFINED IN THE INSTRUCTION FORM 76-11-4

SECTION	CONTAMINANT		EMISSIONS				% CONTROL EFFICIENCY	HOURLY EMISSIONS (LBS/HR)	ANNUAL EMISSIONS (LBS/YR)		
	NAME	CAS NUMBER	ACTUAL	UNIT	HOW DET.	PERMISS.		ACTUAL	ACTUAL	10 <sup>x</sup>	PERMISS.
78	TOTAL PARTICULATES	79 NY075-00-0	80 0.2	81 11	82 4	83	84	85 6.1	86 3.2	87 4	88 3.2
89	SULFUR DIOXIDE	90 7446-09-5	91	92	93	94	95	96 73.8	97 3.8	98 5	99 3.8
100	NITROGEN OXIDES	101 NY210-00-0	102 0.3	103 11	104 4	105	106	107 25.9	108 1.3	109 5	110 3
111		112	113	114	115	116	117	118	119	120	121
122		123	124	125	126	127	128	129	130	131	132

Upon completion of construction sign the statement listed below and forward to the appropriate field representative

THE STATIONARY COMBUSTION INSTALLATION HAS BEEN CONSTRUCTED AND WILL BE OPERATED IN ACCORDANCE WITH STATED SPECIFICATIONS AND IN CONFORMANCE WITH ALL PROVISIONS OF EXISTING REGULATIONS.

133 SIGNATURE OF AUTHORIZED REPRESENTATIVE OR AGENT

DATE

*[Signature]* 9/8/89

134. LOCATION CODE 472200	135. FACILITY ID. NO. 3491	136. U.T.M. (E) 6795	137. U.T.M. (N) 5257	138. SIC NUMBER 8922	139. DATE APPL. RECEIVED / /	140. DATE APPL. REVIEWED / /	141. REVIEWED BY: H. Roman								
<p align="center"><b>PERMIT TO CONSTRUCT</b></p> <table border="1"> <tr> <td>142. DATE ISSUED / /</td> <td>143. EXPIRATION DATE / /</td> <td>144. SIGNATURE OF APPROVAL</td> <td>145. FEE</td> </tr> </table>					142. DATE ISSUED / /	143. EXPIRATION DATE / /	144. SIGNATURE OF APPROVAL	145. FEE	<p>146. DEVIATION FROM APPROVED APPLICATION SHALL VOID THIS PERMIT THIS IS NOT A CERTIFICATE TO OPERATE TESTS AND/OR ADDITIONAL EMISSION CONTROL EQUIPMENT MAY BE REQUIRED PRIOR TO THE ISSUANCE OF A CERTIFICATE TO OPERATE</p>						
142. DATE ISSUED / /	143. EXPIRATION DATE / /	144. SIGNATURE OF APPROVAL	145. FEE												
<p align="center"><b>RECOMMENDED ACTION RE: C.O.</b></p> <table border="1"> <tr> <td>147. DATE ISSUED / /</td> <td>148. EXPIRATION DATE / /</td> <td>149. SIGNATURE OF APPROVAL</td> <td>150. FEE</td> </tr> </table>					147. DATE ISSUED / /	148. EXPIRATION DATE / /	149. SIGNATURE OF APPROVAL	150. FEE	<p>151. 1. <input type="checkbox"/> INSPECTED BY _____ DATE _____ 2. <input type="checkbox"/> INSPECTION DISCLOSED DIFFERENCES AS BUILT VS. PERMIT, CHANGES INDICATED ON FORM 3. <input type="checkbox"/> ISSUE CERTIFICATE TO OPERATE FOR SOURCE 4. <input type="checkbox"/> APPLICATION FOR C.O. DENIED _____ DATE _____ INITIALED _____</p>						
147. DATE ISSUED / /	148. EXPIRATION DATE / /	149. SIGNATURE OF APPROVAL	150. FEE												
<p>152. SPECIAL CONDITIONS:</p> <table border="1"> <tr> <td>1.</td> <td>2.</td> </tr> <tr> <td>3.</td> <td>4.</td> </tr> <tr> <td>5.</td> <td>6.</td> </tr> <tr> <td>7.</td> <td>8.</td> </tr> </table>								1.	2.	3.	4.	5.	6.	7.	8.
1.	2.														
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LOC FAC EP

Appendix III

SIC no. \_\_\_\_\_

PSD Applicability Determination

Facility Name Brookhaven National Laboratory

Address \_\_\_\_\_

FACILITY

Table A: Facility Emissions Summary (T/Yr)

	TSP	SO <sub>2</sub>	CO	NO <sub>x</sub>	VOC	Pb
Current Emissions	29	<del>44</del> 406	13	129	0.7	
Net change this modification	<u>15</u>	<u>39</u> <del>44</del> 445	<u>87</u>	<u>36</u>	<u>1.3</u>	—
New Emissions Total	44	<del>44</del> 445	100	165	2	

- Any attainment pollutants currently 250 T/Y? yes ☒ no ☐
- Is facility listed as one of 28 major source categories? yes ☒ no ☐
- If yes to #2, are any attainment pollutants 100 T/Y? yes ☒ no ☐

If yes to #1 or #3, facility is MAJOR for PSD purposes.

SOURCE

Description of proposed new source(s)

Table B: Emissions from Proposed Source

A	B	C	D	E
Contaminant	Deminimis Level (T/Y)	Annual Emissions at 8760 Hr/Yr (T/Y)	Modified Annual Emissions after netting and SC (T/Y)	D > B Y/N
<u>SO<sub>2</sub></u>	<u>40</u>		<u>39</u>	<u>N</u>
<u>NO<sub>x</sub></u>	<u>40</u>		<u>36</u>	<u>N</u>
<u>TSP</u>	<u>25</u>		<u>15</u>	<u>N</u>

- Is netting available? yes ☒ no ☐
- Are special conditions available? yes ☒ no ☐

If yes, describe on back of page and indicate modified annual emissions on Column D.

If the facility is MAJOR for PSD purposes, the new source IS SUBJECT to PSD for the pollutants indicated on Column E.

- Is source subject to PSD? yes ☐ no ☒

This proposed 97  
George Isomaks  
of 30

83 x 84  
AP42  
res 2 - SS #/KGA  
2.5/1/10 - 20 #/KD

BROOKHAVEN NAT'L LABS

2-B-90

New Boiler

2 COEN LO NOx Burners

will accept permit condition -

→ SO<sub>2</sub>  
DECLINE IS 406 T/Y —  
FUEL USE IS 8384

#5 — WINTER

#6 = SUMMER, SPRING, FALL →

New NOx

NOx

BNL will propose permit  
condition +

DEC will issue PSD  
Now

== NSPS ==

Stack Test for PM  
NO<sub>x</sub> Monitor for  
comp. del.

George T will look into  
exceptions

---

New NSPS — for everything  
will send in supplementary  
information by 2/20/20



BROOKHAVEN NATIONAL LABORATORY  
ASSOCIATED UNIVERSITIES, INC.

Upton, Long Island, New York 11973

(516) 282-  
FTS 666/ 2500

Plant Engineering

February 9, 1990

J. Harrington  
Bureau of Major Source Review  
New York State Department of  
Environmental Conservation  
50 Wolf Road  
Albany, NY 12233-3530

Subject: Brookhaven National Laboratory - Boiler No. 6

Dear Mr. Harrington:

As discussed we have analyzed the fuel consumption of the Laboratory site over the last several years. The analysis begins in FY 1983 which was three years prior to the construction completion of Boiler No. 6.

The first page of the analysis tabulated the type of fuel, percentage of sulfur (by weight), density (lb/gal) and heat value (Btu/gal). The source of the data is also provided. The remaining pages cover fiscal years 1983-1990 and calculate total gallons burned, total site  $SO_2$  emissions in tons/year and the average sulfur percentage in the fuel burned.

The results indicate that total tons per year of sulfur dioxide emissions from the site have remained relatively constant over the last 7 years:

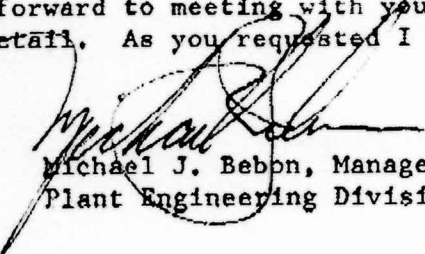
<u>Fiscal Year</u>	<u>Site <math>SO_2</math> (Tons/Yr)</u>
1983 (10-1-82 - 9-30-83)	392 406
1984	420 407
1985	395 372
1986	349 376
1987	404 402
1988	401 372
1989	386
1990 (to date)	171

lowest 2 yr average = 372 Tn/yr

This time period was selected since it coincides with the initial development of Boiler No. 6. Key dates are:

Design initiated by Stone and Webster	8-18-83
Boiler No. 6 Purchase Order	11-20-84
General Construction Contract Award	8-13-85
Boiler delivered to BNL	9-24-85
Construction Completed/Boiler Accepted	5-20-87

We hope this data is helpful. We look forward to meeting with you on Tuesday to review our situation in greater detail. As you requested I have also enclosed a site map for your use.

  
Michael J. Bebon, Manager  
Plant Engineering Division

MB-070:hlm

cc: W. R. Casey  
B. Royce



J. m H

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

M E M O R A N D U M

TO: S. Mohr *pc*  
FROM: R. Capp  
SUBJECT: BNL - Boiler #6  
DATE: January 23, 1990

The application for the above boiler must meet the requirements of PSD and NSPS. Under 40 CFR 52.21 (PSD) the existing facility is considered major without taking into account the emissions from boiler #6. The SO<sub>2</sub> emissions from existing boilers exceed the 250 t/yr., and the de minimis values for SO<sub>2</sub>, NOx and particulates are exceeded.

Unit #6 also comes under 40 CFR 60, Subpart Db, which requires a limitation of 0.4#/MBTU for NOx, and 0.2#/MBTU for Particulates.

We will provide the Central Office staff with the pertinent documents so that they are part of the required review.

At this point, the application, in its current submission, must be considered incomplete due to the additional material needed for a PSD review. These items would include, but not be limited to a BACT demonstration, an ambient Air Quality Impact Analysis and possible ambient monitoring.

J. Harrington has agreed to meet with staff from BNL to discuss these requirements if they wish.

RJC:gn  
cc: H. Berger  
A. Machlin  
J. Harrington ✓  
H. Roman



## FAX MESSAGE

DATE: March 7, 1990  
TO: Jim Harrington, NYS DEC Source Control  
FAX NUMBER: 518-457-0794  
FROM: Marty Fallier, BNL Plant Engineering  
FAX NUMBER 516-282-2884  
SUBJECT: Boiler No. 6 Permit to Construct  
Draft Proposal of Reporting Requirements for  
Emissions Compliance Verification

As discussed in our Telcon earlier today, I have revised the attached "BNL Central Steam Facility Quarterly Air Emissions Report" form to include applicable AP-42 Emissions factors. I trust this information will be sufficient for you to continue the process of issuing a Permit to Construct for Boiler No. 6

A confirming letter from the DOE BHO containing the same information will be forthcoming shortly.

Please give me a call at (516) 282-3475 if you have any questions or require additional information.

MF:  
Attachment  
cc: M. J. Bebon  
W. L. Chaloupka  
E. T. Murphy  
B. Royce  
G. Tsoumpas (SWEC)  
  
File:Blr 6 Permit

# BROOKHAVEN NATIONAL LABORATORY

## Calculation of Annual SO2 Emissions

### Input Data:

<i>Fuel</i>	<i>Sulfur</i>	<i>lb/gal</i>	<i>Btu/gal</i>	<i>Reference</i>
Low Sulfur No. 6 Oil	1.0%	8.2	148,000	ASTM D396 / Analysis
High Sulfur No. 6 Oil	2.0%	8.2	150,000	ASTM D396 / Estimated
Mineral Spirits	0.1%	6.5	120,000	Estimated
"Reconstituted No. 6" Oil	2.0%	8.2	145,000	Estimated
Navy Special	2.0%	8.2	150,000	ASTM D396 / Estimated
Alcohol	0.0%	6.7	75,000	Methanol-Ethanol Avg, Marks, p. 6-8
Marine Diesel	1.5% ←	7.2	142,000	ASTM D975 / Estimated
Jet Fuel / ALF	0.2%	6.8	125,000	ASTM D1655 / Estimated
"Reconstituted No. 4" Oil	2.0%	7.7	142,000	ASTM D396 / Estimated
No. 4 Fuel Oil	1.0%	7.7	142,000	ASTM D396 / Estimated
No. 2 Fuel Oil	0.3%	7.2	138,000	ASTM D396 / Estimated

**Other References:** Gal Burned from Monthly PE Report titled, "Heating Fuel Consumption"

# BROOKHAVEN NATIONAL LABORATORY

## Calculation of Annual SO2 Emissions

**FY 1983**

<i>Fuel</i>	<i>Gal Burned</i>	<i>Sulfur</i>	<i>lb/gal</i>	<i>Btu/gal</i>	<i>Total Fuel (lb/yr)</i>	<i>Total Btu/yr</i>	<i>Total S (lb/yr)</i>
<b>Central Steam Facility</b>							
Low Sulfur No. 6 Oil	2,004,482	1.0%	8.2	148,000	16,436,752	2.97E+11	164,368
High Sulfur No. 6 Oil	0	2.0%	8.2	150,000	0	0.00E+00	0
Mineral Spirits	823,506	0.1%	6.5	120,000	5,352,789	9.88E+10	5,353
"Reconstituted No. 6" Oil	310,844	2.0%	8.2	145,000	2,548,921	4.51E+10	50,978
Navy Special	165,503	2.0%	8.2	150,000	1,357,125	2.48E+10	27,142
Alcohol	0	0.0%	6.7	75,000	0	0.00E+00	0
Marine Diesel	675,328	1.5%	7.2	142,000	4,862,362	9.59E+10	72,935
Jet Fuel	1,044,155	0.2%	6.8	125,000	7,100,254	1.31E+11	14,201
"Reconstituted No. 4" Oil	287,882	2.0%	7.7	142,000	2,216,691	4.09E+10	44,334
Other	0	1.0%	7.7	142,000	0	0.00E+00	0
<b>Total CSF</b>	<b>5,311,700</b>				<b>39,874,894</b>	<b>7.33E+11</b>	<b>379,311</b>
<b>Other Boilers</b>							
No. 4 Fuel Oil	145,054	1.0%	7.7	142,000	1,116,916	2.06E+10	11,169
No. 2 Fuel Oil	75,491	0.3%	7.2	138,000	543,535	1.04E+10	1,631
<b>Total Other</b>	<b>220,545</b>				<b>1,660,451</b>	<b>3.10E+10</b>	<b>12,800</b>
<b>Site Totals</b>	<b>5,532,245</b>				<b>41,535,345</b>	<b>7.64E+11</b>	<b>392,111</b>
<b>Total Site SO2 Emissions</b>							<b>392 Tons/yr</b>
<b>Average S In Fuel by Wgt.</b>							<b>0.9%</b>

# BROOKHAVEN NATIONAL LABORATORY

## Calculation of Annual SO2 Emissions

**FY 1984**

<i>Fuel</i>	<i>Gal Burned</i>	<i>Sulfur</i>	<i>lb/gal</i>	<i>Btu/gal</i>	<i>Total Fuel (lb/yr)</i>	<i>Total Btu/yr</i>	<i>Total S (lb/yr)</i>
<b>Central Steam Facility</b>							
Low Sulfur No. 6 Oil	1,582,369	1.0%	8.2	148,000	12,975,426	2.34E+11	129,754
High Sulfur No. 6 Oil	347,664	2.0%	8.2	150,000	2,850,845	5.21E+10	57,017
Mineral Spirits	858,673	0.1%	6.5	120,000	5,581,375	1.03E+11	5,581
"Reconstituted No. 6" Oil	236,071	2.0%	8.2	145,000	1,935,782	3.42E+10	38,716
Navy Special	192,897	2.0%	8.2	150,000	1,581,755	2.89E+10	31,635
Alcohol	0	0.0%	6.7	75,000	0	0.00E+00	0
Marine Diesel	852,604	1.5%	7.2	142,000	6,138,749	1.21E+11	92,081
Jet Fuel	1,405,672	0.2%	6.8	125,000	9,558,570	1.76E+11	19,117
"Reconstituted No. 4" Oil	216,322	2.0%	7.7	142,000	1,665,679	3.07E+10	33,314
Other	0	1.0%	7.7	142,000	0	0.00E+00	0
<b>Total CSF</b>	<b>5,692,272</b>				<b>42,288,181</b>	<b>7.80E+11</b>	<b>407,215</b>
<b>Other Boilers</b>							
No. 4 Fuel Oil	143,214	1.0%	7.7	142,000	1,102,748	2.03E+10	11,027
No. 2 Fuel Oil	96,693	0.3%	7.2	138,000	696,190	1.33E+10	2,089
<b>Total Other</b>	<b>239,907</b>				<b>1,798,937</b>	<b>3.37E+10</b>	<b>13,116</b>
<b>Site Totals</b>	<b>5,932,179</b>				<b>44,087,118</b>	<b>8.14E+11</b>	<b>420,331</b>
<b>Total Site SO2 Emissions</b>							<b>420 Tons/yr</b>
<b>Average S In Fuel by Wgt.</b>							<b>1.0%</b>

# BROOKHAVEN NATIONAL LABORATORY

## Calculation of Annual SO2 Emissions

**FY 1985**

<i>Fuel</i>	<i>Gal Burned</i>	<i>Sulfur</i>	<i>lb/gal</i>	<i>Btu/gal</i>	<i>Total Fuel (lb/yr)</i>	<i>Total Btu/yr</i>	<i>Total S (lb/yr)</i>
<b>Central Steam Facility</b>							
Low Sulfur No. 6 Oil	1,000,103	1.0%	8.2	148,000	8,200,845	1.48E+11	82,008
High Sulfur No. 6 Oil	203,383	2.0%	8.2	150,000	1,667,741	3.05E+10	33,355
Mineral Spirits	949,652	0.1%	6.5	120,000	6,172,738	1.14E+11	6,173
"Reconstituted No. 6" Oil	86,841	2.0%	8.2	145,000	712,096	1.26E+10	14,242
Navy Special	854,608	2.0%	8.2	150,000	7,007,786	1.28E+11	140,156
Alcohol	0	0.0%	6.7	75,000	0	0.00E+00	0
Marine Diesel	561,123	1.5%	7.2	142,000	4,040,086	7.97E+10	60,601
Jet Fuel	1,949,512	0.2%	6.8	125,000	13,256,682	2.44E+11	26,513
"Reconstituted No. 4" Oil	109,680	2.0%	7.7	142,000	844,536	1.56E+10	16,891
Other	62,891	0.3%	7.2	138,000	452,815	8.68E+09	1,358
<b>Total CSF</b>	<b>5,777,793</b>				<b>42,355,323</b>	<b>7.81E+11</b>	<b>381,297</b>
<b>Other Boilers</b>							
No. 4 Fuel Oil	142,053	1.0%	7.7	142,000	1,093,808	2.02E+10	10,938
No. 2 Fuel Oil	113,895	0.3%	7.2	138,000	820,044	1.57E+10	2,460
<b>Total Other</b>	<b>255,948</b>				<b>1,913,852</b>	<b>3.59E+10</b>	<b>13,398</b>
<b>Site Totals</b>	<b>6,033,741</b>				<b>44,269,176</b>	<b>8.17E+11</b>	<b>394,696</b>
<b>Total Site SO2 Emissions</b>							<b>395 Tons/yr</b>
<b>Average S In Fuel by Wgt.</b>							<b>0.9%</b>



# BROOKHAVEN NATIONAL LABORATORY

## Calculation of Annual SO2 Emissions

**FY 1986**

<i>Fuel</i>	<i>Gal Burned</i>	<i>Sulfur</i>	<i>lb/gal</i>	<i>Btu/gal</i>	<i>Total Fuel (lb/yr)</i>	<i>Total Btu/yr</i>	<i>Total S (lb/yr)</i>
<b>Central Steam Facility</b>							
Low Sulfur No. 6 Oil	2,095,627	1.0%	8.2	148,000	17,184,141	3.10E+11	171,841
High Sulfur No. 6 Oil	31,094	2.0%	8.2	150,000	254,971	4.66E+09	5,099
Mineral Spirits	484,995	0.1%	6.5	120,000	3,152,468	5.82E+10	3,152
"Reconstituted No. 6" Oil	1,546	2.0%	8.2	145,000	12,677	2.24E+08	254
Navy Special	232,136	2.0%	8.2	150,000	1,903,515	3.48E+10	38,070
Alcohol	0	0.0%	6.7	75,000	0	0.00E+00	0
Marine Diesel	748,471	1.5%	7.2	142,000	5,388,991	1.06E+11	80,835
Jet Fuel	1,727,006	0.2%	6.8	125,000	11,743,641	2.16E+11	23,487
"Reconstituted No. 4" Oil	92,066	2.0%	7.7	142,000	708,908	1.31E+10	14,178
CSF No. 2 Fuel Oil	159,793	0.3%	7.2	138,000	1,150,510	2.21E+10	3,452
<b>Total CSF</b>	<b>5,572,734</b>				<b>41,499,822</b>	<b>7.65E+11</b>	<b>340,369</b>
<b>Other Bollers</b>							
No. 4 Fuel Oil	81,645	1.0%	7.7	142,000	628,667	1.16E+10	6,287
No. 2 Fuel Oil	114,948	0.3%	7.2	138,000	827,626	1.59E+10	2,483
<b>Total Other</b>	<b>196,593</b>				<b>1,456,292</b>	<b>2.75E+10</b>	<b>8,770</b>
<b>Site Totals</b>	<b>5,769,327</b>				<b>42,956,114</b>	<b>7.93E+11</b>	<b>349,139</b>
<b>Total Site SO2 Emissions</b>							<b>349 Tons/yr</b>
<b>Average S in Fuel by Wgt.</b>							<b>0.8%</b>

# BROOKHAVEN NATIONAL LABORATORY

## Calculation of Annual SO2 Emissions

**FY 1987**

**REVISED**

<i>Fuel</i>	<i>Gal Burned</i>	<i>Sulfur</i>	<i>lb/gal</i>	<i>Btu/gal</i>	<i>Total Fuel (lb/yr)</i>	<i>Total Btu/yr</i>	<i>Total S (lb/yr)</i>
<b>Central Steam Facility</b>							
Low Sulfur No. 6 Oil	3,853,999	1.0%	8.2	148,000	31,602,792	5.70E+11	316,028
High Sulfur No. 6 Oil	56,892	2.0%	8.2	150,000	466,514	8.53E+09	9,330
Mineral Spirits	278,886	0.1%	6.5	120,000	1,812,759	3.35E+10	1,813
"Reconstituted No. 6" Oil	5,838	2.0%	8.2	145,000	47,872	8.47E+08	957
Navy Special	61,477	2.0%	8.2	150,000	504,111	9.22E+09	10,082
Alcohol	0	0.0%	6.7	75,000	0	0.00E+00	0
Marine Diesel	438,354	1.5%	7.2	142,000	3,156,149	6.22E+10	47,342
Jet Fuel	763,516	0.2%	6.8	125,000	5,191,909	9.54E+10	10,384
"Reconstituted No. 4" Oil	13,813	2.0%	7.7	142,000	106,360	1.96E+09	2,127
CSF No. 2 Fuel Oil	2,678	0.3%	7.2	138,000	19,282	3.70E+08	58
<b>Total CSF</b>	<b>5,036,284</b>				<b>42,907,748</b>	<b>7.82E+11</b>	<b>398,122</b>
<b>Other Boilers</b>							
No. 4 Fuel Oil	138,418	1.0%	7.7	142,000	1,065,819	1.97E+10	10,658
No. 2 Fuel Oil	81,226	0.3%	7.2	138,000	584,827	1.12E+10	1,754
<b>Total Other</b>	<b>219,644</b>				<b>1,650,646</b>	<b>3.09E+10</b>	<b>12,413</b>
<b>Site Totals</b>	<b>5,255,928</b>				<b>44,558,393</b>	<b>8.13E+11</b>	<b>410,534</b>
<b>Total Site SO2 Emissions</b>							<b>411 Tons/yr</b>
<b>Average S in Fuel by Wgt.</b>							<b>0.9%</b>

# BROOKHAVEN NATIONAL LABORATORY

## Calculation of Annual SO2 Emissions

**FY 1988**

<i>Fuel</i>	<i>Gal Burned</i>	<i>Sulfur</i>	<i>lb/gal</i>	<i>Btu/gal</i>	<i>Total Fuel (lb/yr)</i>	<i>Total Btu/yr</i>	<i>Total S (lb/yr)</i>
<b><i>Central Steam Facility</i></b>							
Low Sulfur No. 6 Oil	4,723,244	1.0%	8.2	148,000	38,730,601	6.99E+11	387,306
High Sulfur No. 6 Oil	0	2.0%	8.2	150,000	0	0.00E+00	0
Mineral Spirits	0	0.1%	6.5	120,000	0	0.00E+00	0
"Reconstituted No. 6" Oil	0	2.0%	8.2	145,000	0	0.00E+00	0
Navy Special	0	2.0%	8.2	150,000	0	0.00E+00	0
Alcohol	0	0.0%	6.7	75,000	0	0.00E+00	0
Marine Diesel	0	1.5%	7.2	142,000	0	0.00E+00	0
Jet Fuel	294,777	0.2%	6.8	125,000	2,004,484	3.68E+10	4,009
"Reconstituted No. 4" Oil	0	2.0%	7.7	142,000	0	0.00E+00	0
CSF No. 2 Fuel Oil	18,263	0.3%	7.2	138,000	131,494	2.52E+09	394
<b>Total CSF</b>	<b>5,036,284</b>				<b>40,866,578</b>	<b>7.38E+11</b>	<b>391,709</b>
<b><i>Other Boilers</i></b>							
No. 4 Fuel Oil	101,952	1.0%	7.7	142,000	785,030	1.45E+10	7,850
No. 2 Fuel Oil	88,457	0.3%	7.2	138,000	636,890	1.22E+10	1,911
<b>Total Other</b>	<b>190,409</b>				<b>1,421,921</b>	<b>2.67E+10</b>	<b>9,761</b>
<b>Site Totals</b>	<b>5,226,693</b>				<b>42,288,499</b>	<b>7.65E+11</b>	<b>401,470</b>
<b>Total Site SO2 Emissions</b>							<b>401 Tons/yr</b>
<b>Average S in Fuel by Wgt.</b>							<b>0.9%</b>

# BROOKHAVEN NATIONAL LABORATORY

## Calculation of Annual SO2 Emissions

**FY 1989**

<i>Fuel</i>	<i>Gal Burned</i>	<i>Sulfur</i>	<i>lb/gal</i>	<i>Btu/gal</i>	<i>Total Fuel (lb/yr)</i>	<i>Total Btu/yr</i>	<i>Total S (lb/yr)</i>
<b>Central Steam Facility</b>							
Low Sulfur No. 6 Oil	4,519,664	1.0%	8.2	148,000	37,061,245	6.69E+11	370,612
High Sulfur No. 6 Oil	0	2.0%	8.2	150,000	0	0.00E+00	0
Mineral Spirits	0	0.1%	6.5	120,000	0	0.00E+00	0
"Reconstituted No. 6" Oil	0	2.0%	8.2	145,000	0	0.00E+00	0
Navy Special	0	2.0%	8.2	150,000	0	0.00E+00	0
Alcohol	0	0.0%	6.7	75,000	0	0.00E+00	0
Marine Diesel	0	1.5%	7.2	142,000	0	0.00E+00	0
Alternate Liquid Fuel	677,597	0.2%	6.8	125,000	4,607,660	8.47E+10	9,215
BNL Recovered	11,863	2.0%	7.7	142,000	91,345	1.68E+09	1,827
CSF No. 2 Fuel Oil	5,117	0.3%	7.2	138,000	36,842	7.06E+08	111
<b>Total CSF</b>	<b>5,214,241</b>				<b>41,797,092</b>	<b>7.56E+11</b>	<b>381,765</b>
<b>Other Boilers</b>							
No. 4 Fuel Oil	12,882	1.0%	7.7	142,000	99,191	1.83E+09	992
No. 2 Fuel Oil	171,193	0.3%	7.2	138,000	1,232,590	2.36E+10	3,698
<b>Total Other</b>	<b>184,075</b>				<b>1,331,781</b>	<b>2.55E+10</b>	<b>4,690</b>
<b>Site Totals</b>	<b>5,398,316</b>				<b>43,128,873</b>	<b>7.81E+11</b>	<b>386,455</b>
<b>Total Site SO2 Emissions</b>							<b>386 Tons/yr</b>
<b>Average S In Fuel by Wgt.</b>							<b>0.9%</b>

# BROOKHAVEN NATIONAL LABORATORY

## Calculation of Annual SO2 Emissions

**FY 1990**

**TO DATE**

<i>Fuel</i>	<i>Gal Burned</i>	<i>Sulfur</i>	<i>lb/gal</i>	<i>Btu/gal</i>	<i>Total Fuel (lb/yr)</i>	<i>Total Btu/yr</i>	<i>Total S (lb/yr)</i>
<b>Central Steam Facility</b>							
Low Sulfur No. 6 Oil	2,052,747	1.0%	8.2	148,000	16,832,525	3.04E+11	168,325
High Sulfur No. 6 Oil	0	2.0%	8.2	150,000	0	0.00E+00	0
Mineral Spirits	0	0.1%	6.5	120,000	0	0.00E+00	0
"Reconstituted No. 6" Oil	0	2.0%	8.2	145,000	0	0.00E+00	0
Navy Special	0	2.0%	8.2	150,000	0	0.00E+00	0
Alcohol	0	0.0%	6.7	75,000	0	0.00E+00	0
Marine Diesel	0	1.5%	7.2	142,000	0	0.00E+00	0
Alternate Liquid Fuel	27,869	0.2%	6.8	125,000	189,509	3.48E+09	379
BNL Recovered	354	2.0%	7.7	142,000	2,726	5.03E+07	55
CSF No. 2 Fuel Oil	353	0.3%	7.7	142,000	2,718	5.01E+07	8
<b>Total CSF</b>	<b>2,081,323</b>				<b>17,027,479</b>	<b>3.07E+11</b>	<b>168,767</b>
<b>Other Boilers</b>							
No. 4 Fuel Oil	0	1.0%	7.7	142,000	0	0.00E+00	0
No. 2 Fuel Oil	94,922	0.3%	7.2	138,000	683,438	1.31E+10	2,050
<b>Total Other</b>	<b>94,922</b>				<b>683,438</b>	<b>1.31E+10</b>	<b>2,050</b>
<b>Site Totals</b>	<b>2,176,245</b>				<b>17,710,917</b>	<b>3.20E+11</b>	<b>170,817</b>
<b>Total Site SO2 Emissions</b>							<b>171 Tons/yr</b>
<b>Average S in Fuel by Wgt.</b>							<b>1.0%</b>